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FUNGOUS INSECTS AND THEIR HOSTS.

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This paper is an attempt to list in a definite manner, the various fungous hosts of certain insects. In most entomological papers dealing with fungous insects, the host is recorded simply as a "fungus." This is very indefinite and almost as unsatisfactory as using the term "evergreen" when a definite tree such as *Pinus sylvestris* is meant. In 1908¹ Schwarz called attention to the opportunity of working with fungous insects in view of the many mycologists in the field. At the present time with more mycologists in the field certainly some attempt should be made to list the fungous hosts by at least their generic if not specific names.

The present paper deals almost entirely with the Coleoptera although some insects in other orders are included and the records are the results of observations made for the most part in New Jersey during the past year. No attempt was made to breed out the various fungous gnats whose larvae are so common in gill fungi. The few records copied from published data are followed by the references. The records from States other than New Jersey are due to the kind coöperation of the entomologists whose names appear after such records.

We are greatly indebted to Mr. Chas. Leng for identifications in the Coleoptera and for references to the literature. It is hoped that in a later paper it will be possible to include a bibliography of all publications in which the generic or specific name of the fungus is given, although such references are

¹ Proc. Ent. Soc. Wash., X, 1908, p. 61.

not numerous in American entomological literature. Our thanks are also due to Mr. Chas. Dury for identifications in the *Cisidae*, to Mr. C. W. Frost for many miscellaneous identifications in the Coleoptera, to Dr. W. G. Dietz for his help with the *Tipulidae*, to Mr. August Busck in connection with the micros, to Mr. Crawford and Mr. Cushman who, through the courtesy of Dr. L. O. Howard, identified the parasites, to Mr. C. W. Johnson, Dr. E. P. Felt and Dr. O. A. Johannsen, who identified the Diptera other than the crane flies, and to Mr. Charles Macnamara, who determined the springtails.

What appears to be a definite relationship between certain fungi and insects has been observed in the past by both mycologists and entomologists. Von Schrenk and Spaulding,¹ writing of the fungus *Polyporus obtusus*, state that "the spores of the fungus germinate in the burrows of an oak-boring insect *Prionoxystus robiniae* Peck. The fungus grows in the borings and follows the insect burrows until it reaches the heartwood of the tree." Concerning the disease *Fomes rimosus* of the black locust, they say, "infection takes place through older branches and through tunnels made by the locust borer *Cyrtene robiniae*."

Hopkins, in his "Insect Enemies of the Spruce in the North-east,"² writes as follows about the beetle *Dendroctonus piceaperda* Hopk., and the fungus *Polyporus volvatus* Peck: "Nearly all recently dead trees and even some that are not yet dead but contain broods of the beetle, are found to have small, yellow, globular fungus protruding either from the holes in the roof of the egg galleries or those made when the adults emerged from the bark. This fungus which grows beneath the bark pushes its way out to develop spores or fruiting parts. These fungi are conspicuous objects, and they often occur by hundreds on the bark of the tree for two or three years after they have died and the beetles have emerged. The fact that the work of the spruce-destroying beetle seems to make the conditions more favorable for the introduction and subsequent growth of this fungus indicates that it is more closely associated with the work of this beetle than is any of the other

¹ Bull. 149, U. S. Bur. Pl. Indus.

² Bull. 28, N. S. U. S. Dept. Agric. Bur. Ent.

bark and wood-infesting fungi of the spruce. It therefore serves as good external evidence that the dead trees on which it is found were killed by the beetle. It will, however, grow from the burrows made by other insects in the bark or, as observed in one instance, from the burrows of wood-mining beetles (*Xyloterus bivittatus* Kirby) in wood from which the bark had been removed."

Again Ruggles¹ finds that a relationship appears to exist between *Agrilus bilineatus* and the shoestring fungus *Armillaria mellea* in connection with the death of oak. Whether the fungus is necessarily present first acting as a primary cause of death to the tree or whether the combination causes death is, according to Ruggles, a question for further investigation. Another interesting paper, "The Inhabitants of a Fungus,"² by Henry G. Hubbard, refers to the insect inhabitants of *Cryptoporus volvatus* Peck var. *obvolutus* Peck, found on pine trees of the Pacific Coast Range from the Columbia River northward into British Columbia. Eleven species of beetles are mentioned, together with unidentified lepidopterous and coleopterous larvae, and these are divided into predatory visitors and fungus eaters. In this paper the beetle *Eपुरaea monogama* is said to transport the spores while *Platydemia oregonense* is said to cause the peculiar filaments which form within the veil of the fungus. Murrill in his "Northern Polypores" states that this fungus is largely dependent upon insects for its distribution, that the sporophores often emerge through insect tunnels, the volva is punctured by insects and the spores carried to other trunks by insects. He also states, however, that the sporophore is annual and matures early in the season so that the volva would probably rupture by decay in time to distribute the spores even if no apertures were present.

Fabre in his "Social Life in the Insect World,"³ mentions two beetles as being associated with subterranean fungi, *Anisotoma cinnamomea* on truffles and *Bolboceras gallicus* on *Hydnocystis arenaria* and tells at length in his charming style about his observations on the latter species.

¹ 15th Rep. State Ent. Minn.

² Canad. Ent. Vol. 24, 1892, pp. 250-56.

³ The Century Co., 1913.

In the insect list which follows, the species are recorded as breeding in, feeding on and occurring in or on the fungi. It is extremely probable that those listed as occurring in or on are fungus eaters, except those belonging to such coleopterous groups as the *Carabidae*, and the members of which are predaceous. In the fungus list no attempt has been made to record the activities of the insect again and only the names of the species associated with each fungus are mentioned.

Practically all of the fungi mentioned belong to the families *Polyporaceae* and *Agaricaceae*. In the *Polyporaceae*, "the hymenial surface is generally spread over the inner surfaces of pores or narrow tubes, sometimes over folds or shallow depressions between vein-like reticulations occasionally more or less lamelloid. The sporophores are diverse, generally tough, often very large."¹ In the *Agaricaceae*, "the hymenial surface is confined to radial plates or lamellae, the latter, however, sometimes in the form of folds or veins. The sporophores are generally fleshy with a definite cap or pileus, usually provided with a central stalk, but also excentric, sessile, etc."¹ Members of the *Polyporaceae* are found on both living and dead wood of deciduous and coniferous trees while those of the *Agaricaceae* are mostly terrestrial or occur as a rule on very rotten wood.

INSECT LIST.

ORDER COLEOPTERA.

Family *Carabidae*.

Pterostichus adoxus Say. On *Psilocybe* sp., August, Framingham, Mass. (Frost).

Pterostichus lucublandus Say. On *Pleurotus ostreatus*, June 27, Cornwall, Conn. (Chamberlain).

Family *Hydrophilidae*.

Cercyon praetextatum Say. In *Polyporus albellus*, Sept. 12, Springfield, N. J.

Family *Silphidae*.

Necrophorus pustulatus Hersch. On *Pleurotus ostreatus*, June 27, Cornwall, Conn. (Chamberlain).

Family *Staphylinidae*.

Gyrophaena corruscula Er. On *Armillaria* sp., July, Framingham, Mass. (Frost).

¹ Duggar, B. M. Fungus Diseases of Plants.

- Staphylinus maculosus** Grav. On *Pleurotus ostreatus*, June 27, Cornwall, Conn. (Chamberlain).
- Staphylinus fossator** Grav. On *Lactarius* sp., August, Framingham, Mass. (Frost).
- Philonthus brunneus** Grav. On *Polyporus berkleyi*, August 5, Framingham, Mass. (Frost).
- Philonthus cyanipennis** Fab. On *Amanita* sp., Lakehurst, July 17, N. J.
On *Collybia platyphylla*, July 17, Monmouth Jc., N. J.
- Stilicis angularis** Lec. On *Polyporus berkleyi*, August 5, Framingham, Mass. (Frost).
- Tachinus pallipes** Grav. On *Polyporus berkleyi*, August 5, Framingham, Mass. (Frost). On *Collybia platyphylla*, June 17, Monmouth Jc., N. J.
- Tachinus fimbriatus** Grav. On *Amanita* sp., July 27, Lakehurst, N. J.
On *Collybia platyphylla*, June 17, Monmouth Jc., N. J.
- Boletobius cinctus** Grav. On *Clitocybe maxima*, Framingham, Mass., June 18 (Frost). In *Polyporus albellus*, Union, N. J., Sept. 12.
- Oxyporus vittatus** Grav. Feeding on *Pleurotus ostreatus*, Cincinnati, Ohio (Dury). On *Naucoria* sp., Framingham, Mass., July (Frost).
On *Laccaria amethysta*, Framingham, Mass., Sept. (Frost).
- Oxyporus 5-maculatus** Lec. On *Psilocybe* sp., Monmouth Jc., N. J., June 17. On *Laccaria amethysta*, Framingham, Mass., Sept. (Frost).
- Oxyporus lateralis** Grav. On *Pholiota* sp., Monmouth Jc., May 31. Feeding on *Pleurotus ostreatus*, Cincinnati, Ohio (Dury).
- Oxyporus major** Grav. Feeding on *Pleurotus ostreatus*, Cincinnati, Ohio (Dury).
- Oxyporus stygicus** Say. Feeding on *Pleurotus ostreatus*, Cincinnati, Ohio (Dury).

Family Scaphidiidae.

- Scaphidium 4-guttatum** Say., var. *piceum* Mots. On *Polyporus versicolor*, Princeton Jc., N. J., May 8.
- Baeocera punctipennis** Blatch. Occurs on the large yellow *Clitocybe illudens* (Coleoptera of Indiana, p. 494).
- Scaphisoma repanda** Casey. In *Polyporus gilvus*, Springfield, N. J., May 30.

Family Endomychidae.

- Symbiotes waltoni** Dury. In *Pleurotus* sp., Cincinnati, Ohio (Dury).
- Symbiotes impressus** Dury. In *Pleurotus* sp., Cincinnati, Ohio (Dury).
- Symbiotes duryi** Walton. In *Pleurotus* sp., Cincinnati, Ohio (Dury).
- Lycoperdina ferruginea** Lec. Occurs inside *Lycoperdon pyriforme*, Indiana (Col. Ind. p. 538). Cincinnati, Ohio, May 30 (Dury).
- Endomychus biguttatus** Say. Feeding on *Schizophyllum commune*, Monmouth Jc., N. J., July 12.

Family Erotylidae.

- Dacne 4-maculata** Say. In *Pleurotus ulmarius*, Uhlerstown, Pa., June 11.

- Megalodacne fasciata** Fab. In *Polyporus lucidus*, *Polyporus versicolor* and feeding on *Pleurotus sapidus*, Springfield, N. J., May 30.
- Megalodacne ulkei** Crotch. On *Polyporus cuticularis*, Indiana (Col. Ind. p. 545).
- Ischyrys 4-punctatus** Oliv. Feeding on and breeding in *Poria* sp., Springfield, N. J., July 10.
- Mycotretus pulchra** Say. Breeds in *Polyporus chioneus*, Monmouth Jc., N. J., Sept. 8.
- Tritoma humeralis** Fab. Feeding on *Clitocybe maxima*, Framingham, Mass. (Frost).
- Tritoma biguttata** Say. On *Armillaria* sp., Monmouth Jc., N. J., July 7.
- Tritoma thoracica** Say. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). Feeding on *P. ostreatus*, Monmouth Jc., N. J., May 30.
- Tritoma flavicollis** Lec. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Family **Mycetophagidae.**

- Mycetophagus flexuosus** Say. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). On *Polyporus berkleyi*, Framingham, Mass. (Frost). In *Polyporus versicolor*, South River, May 14, Riverton, May 5; in *Polyporus albellus*, Union, Sept. 12; on *Polyporus galactinus*, Union, Sept. 12; in *Polyporus betulinus*, Princeton Jc., May 8; in *Polyporus tsugae*, New Brunswick, N. J., Sept. 24.
- Mycetophagus melsheimeri** Lec. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).
- Mycetophagus punctatus** Say. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). Feeding in *Polyporus amorphus*, New Brunswick, N. J., July 26.
- Mycetophagus pluriguttatus** Lec. In *Daedalia confragosa*, New Brunswick, N. J., April 9.
- Crosimus hirtus** Casey. On *Daedalia quercina*, Monmouth Jc., N. J., June 12.
- Litargus didesmus** Say. On *Naucoria* sp., Framingham, Mass., July (Frost).

Family **Dermestidae.**

- Attagenus piceus** Oliv. In *Lenzites betulina*, New Brunswick, N. J., March 6.

Family **Histeridae.**

- Hister unicus** Csy. On *Clitocybe robusta*, Framingham, Mass., July (Frost).
- Hister sedecimstriatus** Say. On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost).
- Hister abbreviatus** Fab. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

- Hister interruptus** Beauv. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).
Hister cognatus Lec. On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost).
Hister lecontei Mars. On *Polyporus dichrous*, *Polyporus versicolor*, Springfield, N. J., May 13, April 10; in *Polyporus albellus*, Union, N. J., Sept. 12; in *Polyporus hirsutus*, Monmouth Jc., N. J., April 29.

Family Nitidulidae.

- Colastus truncatus** Rand. In *Polyporus graveolens*, Monmouth Jc., N. J., April 9.
Eपुरaea ovata Horn. Feeding on *Lactarius* sp., Monmouth Jc., N. J., July 12; on *Polyporus cuticularis*, New Brunswick, N. J., October 1.
Nitidula bipunctata Linn. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).
Stelidota octomaculata Say. In *Polyporus chineous*, Springfield, N. J., Sept. 12.
Phenolia grossa Fab. On *Polyporus versicolor*, Swedesboro, N. J., June 30; breeding in *Polyporus sulphureus*, Springfield, N. J., Sept. 12; on *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost).
Omosita colon Linn. On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost).
Pallodes pallidus Beauv. Feeding on *Russula* sp., Lakehurst, N. J., July 17; feeding on *Collybia platyphylla*, Monmouth Jc., N. J., June 17.
Ips quadriguttatus Oliv. On *Polyporus betulinus*, Oradell, N. J., April 23; on *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). In *Polyporus cuticularis*, New Brunswick, N. J., Oct. 1.

Family Trogositidae.

- Thymalus fulgidus** Er. Breeds in *Polyporus betulinus*, *Daedalia confragosa*, Morristown, Oradell, High Bridge, Monmouth Jc., N. J.
Tenebrioides corticalis Melsh. On *Polyporus versicolor*, Union, N. J., May 8, June 27; in *Polyporus betulinus* and *Polyporus gilvus*, Princeton Jc., May 8, Sept. 12, N. J.

Family Ptinidae.

- Eucrada humeralis** Mels. Bred from *Polyporus gilvus*, Monmouth Jc., N. J., March 26.
Hemiptychus nigrutilus Lec. In *Fomes applanatus* breeding in this fungus, Monmouth Jc., N. J., May 30, adults, pupae, larvae.
Caenocara oculata Say. On *Scleroderma vulgare*, Lakehurst, N. J., July 17.
Dorcatoma dresdensis Hbst. Reared from *Fomes fomentarius* in Wisconsin (Proc. Ent. Soc. Wash., X, 1908, p. 61).

Family *Bostrychidae*.

Endecatomus rugosus Rand. Breeds in *Polyporus gilvus*, Union, N. J., Sept 12, larvae, pupae, adults. In *P. gilvus*, Staten Island, N. Y. (Davis). In *Polyporus versicolor*, Springfield, N. J., March 20, June 27, September 12.

Family *Cisidae*.

Cis cylindrica Dury. In *Fomes pinicola*, Corvallis, Oregon, August 14 (W. J. Chamberlain).

Cis hirsuta Csy. In *Panus rudis*, Monmouth Jc., N. J., June 17.

Cis fuscipes Mell. Breeds in *Polyporus versicolor*, *Lenzites betulina*, *Polyporus hirsutus* in various parts of New Jersey. Feeding in *Polyporus conchifer*, Bound Brook, N. J., May 2.

Cis curtula Csy. In *Polyporus pargamenus*, Monmouth Jc., N. J., May 30. In *Polyporus cinnabarinus*, Richwood, N. J., June 30.

Cis wenzeli Dury. In *Polyporus cinnabarinus*, Centre Hall, Pa., May 26. Husted, Richwood, N. J., June 30. In *Polyporus versicolor*, Del. Co., Pa. (Jour. Cin. Soc. Nat. His., XXII, 2, 1917, p. 7).

Xestocis levettei Csy. In *Polyporus versicolor*, Milltown, N. J., May 18. In *Fomes applanatus*, Union, Monmouth Jc., N. J., May 30.

Xestocis moznettei Dury. Bred from *Polyporus* sp., Corvallis, Oregon, March 10 (Jl. Cin. Soc. Nat. His., XXII, 1917, pp. 1-28)

Brachycis brevicollis Csy. Breeds in *Polyporus gilvus*, *Fomes bakeri*, *Fomes igniarius*, Springfield, Monmouth Jc., High Bridge, N. J.

Ceracis sallei Mell. Breeds in *Polyporus gilvus*, *P. versicolor*, *P. hirsutus*, *P. dichrous*, *Fomes applanatus*, *F. igniarius*, *Lenzites betulina*, Springfield, Morristown, etc., N. J. In *Polyporus fumosus*, *Fomes lobatus*, *Polyporus curtisi*, Springfield, N. J., May, July.

Strigocis opacicollis Dury. In *Polyporus versicolor*, Swedesboro, N. J., June 30.

Sulcaxis lengi Dury. Breeds in *Lenzites betulina*, *Polyporus versicolor*, *P. gilvus*, *P. hirsutus*, Monmouth Jc., June 10; in *Polyporus fumosus*, Springfield, N. J., May 13.

Ennearthron compacta Dury. Breeds in *Fomes marmoratus*, Key West, Fla. (Jour. Cin. Soc. Nat. His., XXII, 2, 1917, p. 22).

Ennearthron thoracicornae Ziegl. Breeds in *Polyporus gilvus*, *Lenzites betulina*, *Daedalia unicolor*, *Polyporus pargamenus*, *Polyporus fumosus*, Springfield, Monmouth Jc., N. J., April, May.

Ennearthron oblongus Blatch. In *Polyporus versicolor*, Orient, L. I., N. Y., April 1 (W. T. Davis).

Octotemnus denudatus Csy. Breeds in *Polyporus versicolor*, Oregon (Jour. Cin. Soc. Nat. His., XXII, 2, 1917, p. 27).

Octotemnus laevis Csy. In *Lenzites betulina*, Monmouth Jc., N. J., May 6, in *Polyporus versicolor*, Hunterdon Co., N. J., March 12.

Rhipidandrus paradoxus Beauv. Feeding on *Pleurotus ostreatus*, Monmouth Jc., N. J., June 10. In *Polyporus cuticularis*, New Brunswick, N. J., October 1.

Family **Scarabaeidae.**

Onthophagus hecate Panz. On *Polyporus versicolor*, Princeton Jc., N. J., May 8.

Geotrupes balyi Jek. On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost).

Geotrupes horni Blanch. On ground beneath *Lactarius* sp., Framingham, Mass., August (Frost).

Family **Tenebrionidae.**

Scotobates calcaratus Fab. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Xylopinus saperdioides Oliv. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Diaperis maculata Oliv. Feeding on *Clitocybe maxima*, Framingham, Mass. (Frost); on *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost); on *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain); feeding in *Polyporus albellus*, Springfield, N. J., July 10; on *Polyporus tsugae*, New Brunswick, N. J., Sept. 24; feeding on *Lentinus lepideus*, Monmouth Jc., N. J., July 7; breeds in *Polyporus betulinus*, Princeton Jc., N. J., April 23, May 8.

Hoplocephala bicornis Oliv. Feeds in *Polyporus hirsutus*, *P. versicolor*, *P. cinnabarinus* and *Lenzites betulina*, Springfield, New Brunswick, Husted, N. J., February, March, April, May, June.

Hoplocephala viridipennis Fab. In *Polyporus versicolor*, Springfield, N. J., March 13.

Platydema subcostatum Lap. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Platydema ellipticum Fab. Breeds in *Polyporus gilvus*, Springfield, N. J., Sept. 12.

Platydema ruficorne Sturm. In *Polyporus dichrous*, *P. lucidus*, Springfield, Plainfield, N. J., May.

Boletotherus bifurcus Fab. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain). Breeds in *Fomes applanatus*, *Polyporus tsugae*, *Polyporus lucidus*; feeding on *Polyporus versicolor*; larvae during winter, adults during winter under bark. Plainfield, Barnegat, Union, Springfield, New Brunswick, Monmouth Jc., N. J., April, May, June, September, October.

Helops micans Fab. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Family **Melandryidae.**

Penthe obliquata Fab. On *Polyporus berkleyi*, Framingham, Mass., August 5 (Frost). On *Polyporus versicolor*, *P. betulinus*, Princeton Jc., N. J., May 8, April 23.

Eustrophus bicolor Say. Larva feeding on *Pleurotus sapidus*, *Polyporus squamosus*, *Poria* sp., *Polyporus albellus*, *Polyporus amorphus*, *Lentinus lepideus*, Monmouth Jc., Union, New Brunswick, N. J., May, June, July, September. On *Polyporus betulinus*, *P. versicolor*, *Daedalia confragosa*, Princeton Jc., N. J., April, May.

Hallomenus scalpularis Melsh. Occurs on *Polyporus sulphureus*, Indiana (Col. Ind., p. 1294).

Orchesia castanea Mels. Breeds in *Trametes suaveolens*, *Polyporus hispidus*, *Lenzites betulina*, *Lenzites saepiaria*, Kingston, Monmouth Jc., New Brunswick, N. J., April, May, June. In *Polyporus versicolor*, Union, N. J., June 27.

Family Mordellidae.

Tomoxia bidentata Say. On *Pleurotus ostreatus*, Cornwall, Conn., June 27 (Chamberlain).

Mordella marginata Melsh. Bred from *Lenzites saepiaria*, Uhlerstown, Pa., June 11.

Family Anthribidae.

Cratoparis lunatus Fabr.¹ In *Polyporus hirsutus*, *P. dichrous*, *P. betulinus*, *P. versicolor*. On *Polyporus brumalis*, *P. pargamenus*, *Panus rudis*, throughout N. J., April, March, June.

ORDER THYSANURA.

Achorutes armatus Nicolet. Feeding on *Pholiota marginella*, Monmouth Jc., N. J., May 30.

Papirius pini Folsom. On various species of gill fungi. Monmouth Jc., N. J., Sept. 8.

ORDER HEMIPTERA.

Aradus similis Say. In and on *Polyporus betulinus*, in various parts of New Jersey. On *Fomes pinicola*, Centre Hall, Pa., May 28.

ORDER LEPIDOPTERA.

Tinea cloacella Haw. Breeds in *Polyporus sulphureus*, *Polyporus tsugae*, *Fomes igniarius*, *Polyporus borealis*, Matewan, New Brunswick, High Bridge, N. J., overwinters as larva.

Tinea acapnopennella Clem. Breeds in *Polyporus tulipiferus*, N. J., August.

Hybroma servulella Clem. Bred from *Lenzites betulina*, New Brunswick, N. J., May 25.

ORDER HYMENOPTERA.

Cothonaspis, sp. Bred from *Polyporus lucidus*, Monmouth Jc., N. J., April 14.

Eubadizon, n. sp. Bred from cocoons found in larval and pupal chambers of *Boletotherus bifurcus* in *Fomes applanatus*, Springfield, N. J., May 26.

Trigonoderus, sp. Bred from *Polyporus versicolor*, Middlesex Co., N. J., March.

¹ *Euparius marmoreus* Oliv., is latest name.

Trigonoderus ungtutus Gir. Bred from *Polyporus gilvus*, Monmouth Jc., N. J., March 25.

Entedoninae, n. gen., n. sp. Bred from *Lenzites betulina*, Middlesex Co., N. J.

ORDER DIPTERA.

Limnobia cinctipes Say. Bred from *Polyporus dichrous*, Monmouth Jc., N. J., June 12.

Discobola argus Say. On *Polyporus albellus*, Union, N. J., Sept. 12. Dr. Dietz states that he has bred this from *Polyporus* sp.

Leia bivittata Say. Breeds in *Lenzites betulina*, *Polyporus tsugae*, *Polyporus lucidus*, New Brunswick, Springfield, N. J., May.

Sciara pauciseta Felt. Bred from *Polyporus dichrous*, Monmouth Jc., N. J., June 20.

Winnertzia, n. sp. Bred from *Lenzites saepiaria*, Plainfield, N. J., March 31.

Pseudotephritis vau Say. In *Lenzites betulina*, Middlesex Co., N. J., April 14. In *Polyporus hirsutus*, Monmouth Jc., May 5, N. J.

FUNGOUS HOST LIST.¹

ORDER AGARICALES.

Family *Polyporaceae*.

Polyporus squamosus Hudson.

Eustrophus bicolor Say.

Polyporus brumalis Persoon.

Euparius marmoreus Oliv.

Polyporus betulinus Bulliard.

Mycetophagus flexuosus Say.

Ips quadriguttatus Fab.

Thymalus fulgidus Er.

Tenebrioides corticalis Melsh.

Diaperis maculata Oliv.

Penthe obliquata Fab.

Eustrophus bicolor Say.

Euparius marmoreus Oliv.

Aradus similis Say (Hemip.).

Polyporus berkleyi Fries.

Philonthus brunneus Grav.

Stilicicus angularis Lec.

Tachinus pallipes Grav.

Mycetophagus flexuosus Say.

Hister sedecimstriatus Say.

Hister cognatus Lec.

¹ The name of each fungus is followed by the names of the insects associated with it. Insect names not followed by an abbreviation in parentheses belong to the Order Coleoptera.

- Phenolia grossa* Fab.
Omosita colon L.
Geotrupes balyi Jek.
Diaperis maculata Oliv.
Penthe obliquata Fab.
- Polyporus sulphureus** Buillard.
Hallomenus scapularis Melsh.
Phenolia grossa Fab.
Tinea cloacella Haw. (Lep.).
- Polyporus fumosus** Persoon.
Sulcaxis lengi Dury.
Ennearthron thoracicorne Ziegl.
- Polyporus amorphus** Fries.
Eustrophus bicolor Say.
Mycetophagus punctatus Say.
- Polyporus conchifer** Schw.
Cis fuscipes Mell.
- Polyporus tulipiferus** Schw.
Tinea acapnopennella Clem. (Lep.).
- Polyporus pargamenus** Fries.
Cis curtula Csy.
Ennearthron thoracicorne Ziegl.
Euparius marmoreus Oliv.
- Polyporus versicolor** L.
Scaphidium 4-guttatum Say.
Megalodacne fasciata Fab.
Mycetophagus flexuosus Say.
Hister lecontei Mars.
Phenolia grossa Fab.
Tenebrioides corticalis Melsh.
Endecatomus rugosus Rand.
Cis fuscipes Mell.
Cis wenzeli Dury.
Xestocis levettei Csy.
Sulcaxis lengi Dury.
Strigocis opacicollis Dury.
Octotemnus laevis Csy.
Octotemnus denudatus Csy.
Ennearthron oblongus Blatch.
Onthophagus hecate Panz.
Hoplocephala bicornis Oliv.
Hoplocephala viridipennis Fab.
Boletotherus bifurcus Fab.
Penthe obliquata Fab.

Eustrophus bicolor Say.
Orchesia castanea Mels.
Euparius marmoreus Oliv.

Polyporus hirsutus Wulf.

Hister lecontei Mars.
Cis fuscipes Mell.
Sulcaxis lengi Dury.
Hoplocephala bicornis Oliv.
Euparius marmoreus Oliv.
Pseudotephritis vau Say (Dip.).

Polyporus dichrous Fries.

Hister lecontei Mars.
Ceracis sallei Mell.
Platydema ruficorne Sturm.
Euparius marmoreus Oliv.
Limnobia cinctipes Say (Dip.).
Sciara pauciseta Felt. (Dip.).

Polyporus borealis Fries.

Tinea cloacella Haw. (Lep.).

Polyporus chioneus Fries.

Mycotretus pulchra Say.
Stelidota octomaculata Say.

Polyporus albellus Peck.

Cercyon praetextatum Say.
Diaperis maculata Say.
Eustrophus bicolor Say.
Mycetophagus flexuosus Say.
Boletobius cinctus Grav.
Hister lecontei Mars.
Discobola argus Say (Dip.).

Polyporus galactinus Berk.

Mycetophagus flexuosus Say.

Polyporus cinnabarinus Jacq.

Cis wenzeli Dury.
Hoplocephala bicornis Oliv.
Cis curtula Csy.

Polyporus lucidus Leys.

Megalodacne fasciata Fab.
Platydema ruficorne Sturm.
Boletotherus bifurcus Fab.
Leia bivittata Say (Dip.).

Polyporus curtisi Berk.

Ceracis sallei Mell.

Polyporus tsugae Murrill.

- Boletotherus bifurcus* Fab.
Diaperis maculata Oliv.
Mycetophagus flexuosus Say.
Tinea cloacella Haw. (Lep.).
Leia bivittata Say (Dip.).

Polyporus graveolens Schw.

- Colastus truncatus* Rand.

Polyporus hispidus Bull.

- Orchesia castanea* Mels.

Polyporus gilvus Schw.

- Scaphisoma repanda* Csy.
Eucrada humeralis Mels.
Endecatomus rugosus Rand.
Brachycis brevicollis Csy.
Ceracis sallei Mell.
Sulcacis lengi Dury.
Ennearthron thoracicorne Ziegl.
Tenebrioides corticalis Melsh.
Platydema ellipticum Fab.
Ischyrys 4-punctatus Oliv.

Polyporus cuticularis Bull.

- Megalodacne ulkei* Crotch.
Rhipidandrus paradoxus Beauv.
Epuraea ovata Horn.
Ips quadriguttatus Oliv.

Fomes pinicola Swen.

- Cis cylindrica* Dury.
Aradus similis Say (Hemip.).

Fomes bakeri Murrill.

- Brachycis brevicollis* Csy.

Fomes fomentarius L.

- Dorcatoma dresdensis* Hbst.

Fomes igniarius L.

- Brachycis brevicollis* Csy.
Ceracis sallei Mell.
Tinea cloacella Haw. (Lep.).

Fomes lobatus Schw.

- Ceracis sallei* Mell.

Fomes applanatus Persoon.

- Hemiptychus nigrutilus* Lec.
Xestocis levettei Csy.
Boletotherus bifurcus Fab.

Fomes marmoratus.*Ennearthron compacta* Dury.**Trametes suaveolens** L.*Orchesia castanea* Mels.**Daedalia unicolor** Bull.*Ennearthron thoracicorne* Ziegl.**Daedalia confragosa** Bolton.*Mycetophagus pluriguttatus* Lec.*Thymalus fulgidus* Er.*Eustrophus bicolor* Say.**Daedalia quercina** Linn.*Crosinus hirtus* Csy.**Lenzites betulina** Linn.*Attagenus piceus* Oliv.*Cis fuscipes* Mell.*Ceracis sallei* Mell.*Sulcaxis lengi* Dury.*Ennearthron thoracicorne* Ziegl.*Octotemnus laevis* Csy.*Hoplocephala bicornis* Oliv.*Orchesia castanea* Mels.*Hybroma servulella* Clem. (Lep.).*Leia bivittata* Say. (Dip.).*Pseudotephritis vou* Say (Dip.).**Lenzites saepiaria** Fries.*Orchesia castanea* Mels.*Mordella marginata* Melsh.*Winnertzia*, n. sp. (Dip.).**Poria, sp.***Ischyryus 4-punctatus* Oliv.*Eustrophus bicolor* Say.

Family Agaricaceae.

Schizophyllum commune Fries.*Endomychus biguttatus* Say.**Pleurotus ostreatus** Fries.*Pterostichus lucublandus* Say.**Necrophorus pustulatus* Hersch.**Staphylinus maculosus* Grav.**Oxyporus vittatus* Grav.*Oxyporus lateralis* Grav.*Oxyporus major* Grav.*Oxyporus stygicus* Say.*Tritoma thoracica* Say.**Tritoma flavicollis* Lec.*

Mycetophagus flexuosus Say.*
Mycetophagus melsheimeri Lec.*
Mycetophagus punctatus Say.*
Hister abbreviatus Fab.*
Hister interruptus Beauv.*
Nitidula bipunctata Linn.*
Phenolia grossa Fab.*
Ips quadriguttatus Oliv.*
Rhipandrus paradoxus Beauv.
Scotobates calcaratus Fab.*
Xylopinus saperdioides Oliv.*
Diaperis maculata Oliv.*
Platydema subcostatum Lap.*
Boletotherus bifurcus Fab.*
Helops micans Fab.*
Tomoxia bidentata Say.*

Pleurotus *sapidus* Kalchb.

Megalodacne fasciata Fab.
Eustrophus bicolor Say.

Pleurotus *ulmarius* Fries.

Dacne q-maculata Say.

Panus *rudis*.

Euparius marmoreus Oliv.
Cis hirsuta Csy.

Lentinus *lepideus* Fries.

Diaperis maculata Oliv.
Eustrophus bicolor Say.

Armillaria, sp.

Gyrophæna corruscula Er.
Tritoma biguttata Say.

Amanita, sp.

Philonthus cyanipennis Fab.
Tachinus fimbriatus Grav.

Collybia *platyphylla* Fries.

Philonthus cyanipennis Fab.
Tachinus pallipes Grav.
Tachinus fimbriatus Grav.
Pallodes pallidus Beauv.

Clitocybe *illudens* Schw.

Baeocera punctipennis Blatch.

Clitocybe *robusta* Peck.

Hister unicus Csy.

- Clitocybe maxima** G. and M.
Boletobius cinctus Grav.
Tritoma humeralis Fab.
Diaperis maculata Oliv.
- Russula, sp.**
Pallodes pallidus Beauv.
- Lactarius, sp.**
Staphylinus fossator Grav.
Epuraea ovata Horn.
- Naucoria, sp.**
Oxyporus vittatus Grav.
Litargus didesmus Say.
- Pholiota marginella.**
Achorutes armatus Nicolet. (Thys.).
- Pholiota, sp.**
Oxyporus lateralis Grav.
- Psilocybe spadicea** Fries.
Pterostichus adoxus Say.
Oxyporus 5-maculatus Lec.
- ORDER LYCOPERDALES.
 Family Lycoperdaceae.
- Lycoperdon pyriforme** Schoef.
Lycoperdina ferruginea Lec.
- ORDER SCLERODERMATALES.
- Scleroderma vulgare** Fr.
Caenocara oculata Say.



Table I summarizes the Coleoptera of the insect list. The 100 species mentioned are distributed in twenty families of which the *Staphylinidae*, *Cisidae* and *Tenebrionidae* each furnish a comparatively large number. This table also shows that most of the *Staphylinidae* were collected on gill fungi and most of the *Cisidae* on polypores and that the members of the other families appear to be equally at home on either group of fungi.

Table I

Family	Total no. species on all fungi.	No. species found on polypores.	No. species found on gill fungi.	No. species on both.	On puffballs.
Carabidae.....	2	.....	2	.....	.....
Hydrophilidae.....	1	1	.....	.....	.....
Silphidae.....	1	.....	1	.....	.....
Staphylinidae.....	14	3	11	.....	.....
Scaphidiidae.....	3	2	1	.....	.....
Endomychidae.....	5	.....	4	.....	1
Erotylidae.....	9	3	5	1	.....
Mycetophagidae....	6	2	3	1	.....
Dermestidae.....	1	1	.....	.....	.....
Histeridae.....	6	3	3	.....	.....
Nitidulidae.....	8	3	2	3	.....
Trogositidae.....	2	2	.....	.....	.....
Ptinidae.....	4	3	.....	.....	1
Bostrychidae.....	1	1	.....	.....	.....
Cisidae.....	17	15	1	1	.....
Scarabaeidae.....	3	2	1	.....	.....
Tenebrionidae.....	10	4	4	2	.....
Melandryidae.....	4	3	.....	1	.....
Mordellidae.....	2	1	1	.....	.....
Anthribidae.....	1	.....	.....	1	.....
Totals.....	100	49	39	10	2

In the *Polyporaceae*, *Polyporus versicolor* appears to attract the most species, 23 having been found associated with this form. However, *Polyporus gilvus*, *P. albellus*, *P. dichrous*, *P. hirsutus*, *P. betulinus*, *P. berkleyi* and *Lenzites betulina*, are also beetle favorites. In the *Agaracaceae*, *Pleurotus ostreatus* was found to harbour 25 species. The 20 species marked by an asterisk under the name of this fungus were found in a single specimen on June 27 at Cornwall, Conn., by Mr. K. F. Chamberlain. The fact that this fungus is tougher and more persistent than most other gill fungi may account for its being a favorite.

Many of the gill fungi are attacked as soon as they appear above ground, while as a rule, the polypores may attain considerable growth, in fact



